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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,899	11/18/2003	Michael F. Deering	5181-09612	5662

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EXAMINER	
NGUYEN, PHU K	

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/715,899	DEERING, MICHAEL F.	
	Examiner	Art Unit	
	Phu K. Nguyen	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 February 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15,24-29 and 33 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) 1-15, 24-29, 33 is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Phu Nguyen

PHU K. NGUYEN
PRIMARY EXAMINER
GROUP 2300

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: ____.

The Final Office action mailed on June 2, 2006 had been withdrawn in view of the Decision of Pre-Appeal Brief Conference.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15, and 24-29, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over FORAN et al. (6,072,500) in view of COSMAN (5,651,104).

As per claim 1, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which defines the supersampling region; column 7, lines 19-30); a sample buffer coupled to said graphics processor for storing the plurality of samples (Foran, image processor buffer 52; column 5, lines 41-65); and a sample-to-pixel calculation unit coupled to said sample buffer, wherein said sample-to-pixel calculation unit is configured to select

samples from sample buffer and filter said samples to form output pixels, (Foran, image processors 60; column 6, lines 9-32). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. However, Cosman teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Cosman, the supersampling rate is adaptively adjusted according to the relative position of the polygon 20 to the viewpoint; column 6, lines 35-45, column 7, lines 54-56, and column 10, lines 17-32). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides the improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 2 adds into claim 1 "wherein said graphics processor is configured to vary the density of the samples generated within at least a particular one of plurality regions on a basis selected from the group consisting of: a per-scan line basis, a per-group-of-scan-line basis, a per-region basis, a per-pixel basis, and a per-group-of-pixel basis" which Foran does not explicitly teach. However, Cosman teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Cosman, column 7, lines 54-56, and column 10, lines 17-32; the adaptive supersampling method in which the pixels on the region/polygon 20 varied according to the relative position of the olygon 20 to the view point). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel,

wherein the density varies by region" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 3 adds into claim 1 "wherein said density of samples per pixel for at least one of plurality regions is based one or more of the following: input from an eye-tracking device, input from a head-tracking device, input from a hand-tracking device, input from a mouse, a cursor position, a visible object position, and a main character position" which Foran teaches in column 3, lines 50-54, column 4, lines 11-30 in which the input is from host computer 10 with the polygon information.

Claim 4 adds into claim 1 "said density samples per pixel for at least one of plurality regions is varied according to input from a gaze tracking device" which Foran does not explicitly teach. However, given Foran's graphics processor 10, it would have been obvious to a person of ordinary skill in the art to have the input with varied density from a gaze tracking device because the accuracy and easy manipulation of the gaze tracking device.

Claim 5 adds into claim 1 "said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities" which Foran does not teach. Cosman teaches that such "said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities" is well known in the art (Cosman, the supersampling rate is predetermined for the polygon with a

maximum supersampling rate; column 6, lines 35-45, column 7, lines 54-56, and column 10, lines 17-32). It would have been obvious to use an adaptive supersampling method for "said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities" because because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 6 adds into claim 1 "said density of samples per pixel is substantially continuously variable across one or more frame region boundaries" which Foran does not explicitly teach. However, given Foran's antialiasing technique, it would have been obvious to have the density being substantially continuous because it reduces artifacts by smoothing the appearance of the displayed image.

Claim 7 adds into claim 1 "said sample-to-pixel calculation unit is configured to filter samples to form output pixels on a real time basis" which Foran teaches in column 14, lines 6-26 in which the speed of operation significantly improves.

Claim 8 adds into claim 1 "said sample-to-pixel calculation unit is configured to filter samples to form output pixels on an on-the-fly basis" which Foran teaches in column 13, lines 37-55.

Claim 9 adds into claim 1 "at least a part of each sample is double-buffered in said sample buffer" which Foran does not explicitly. However, given Foran's image buffer for graphics data, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the double-buffer for storing data because it reduces the processing time by allowing simultaneously read and write operations perform on the buffer.

Claim 10 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store information usable to determine sample positions for each sample rendered for a particular pixel position" which Foran does not explicitly teach. However, Cosman teaches that such "information usable to determine sample positions for each sample rendered for a particular pixel position" is well known in the art (Cosman, the MIP map with different level of details and the variable supersampling rate; column 6, lines 46-65, column 7, lines 54-56). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" and "variable density of samples per pixel, wherein the density varies by region" because because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 11 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more

sample position schemes, and wherein said graphics processor is configured to read sample positions from said sample position memory" which Foran teaches in column 5, line 66 to column 6, line 32.

Claim 12 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more sample position schemes for one or more sample densities, wherein said graphics processor is configured to read sample positions from said sample position memory according to a selected sample density and a selected sample position scheme" which Foran teaches in column 5, line 66 to column 6, line 32; column 7, lines 31-49.

Claim 13 adds into claim 1 "said graphics processor is configured to store samples in said sample buffer according to bins, wherein each bin has a position, wherein each sample within a bin is assigned an offset relative to said bin positions, and wherein said bin positions correspond to pixel positions on a display device" which Foran does not teach. However, given Foran's image region memories 52, it would have been obvious to arrange the memory into the sections such as bins or bit map in which the bin's position correspond to the pixel's offset position on display because it increases the memory access time by allowing a group of pixel data to be processed simultaneously.

Claim 14 adds into claim 1 "said bin positions corresponds to pixel positions on a display device" which Foran does not explicitly teach. However, Cosman teaches that

such "said bin positions corresponds to pixel positions on a display device" is well known in the art (Cosman, the MIP map with different level of details; column 6, lines 46-65 and column 7, lines 54-56). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 15 adds into claim 1 "the specified portion varies by region" which Foran does not teach. Cosman teaches that such "the specified portion varies by region" is well known in the art (Cosman, the supersampling rate is adaptively adjusted according to the relative position of the polygon 20 to the viewpoint; column 6, lines 35-45, column 7, lines 54-56, and column 10, lines 17-32). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" and "variable density of samples per pixel, wherein the density varies by region" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claims 24-25 claim method based on the system of claims 1-19; therefore, they are rejected under the same reason (see also Foran, column 15, lines 37-42).

Claims 26-28 claim a graphics system based on the graphics system of claims 1-18, therefore, they are rejected under the same reason.

Claim 29 adds into claim 27 "the specified portion for each region is determined by input from a tracking device" which Foran does not teach. However, Cosman teach that a tracking means for tracking the relative position of the polygon 20 to the viewpoint is well known in the art (Cosman, column 6, lines 7-26). It would have been obvious to use an adaptive supersampling method for "tracking the variable sampling regions, wherein the density varies by region" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claim 30 is similar to claim 28 but specifies that the samples for supersampling rate is N and the number of samples used for calculating is less than N which Foran does not teach. Cosman teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Cosman, the supersampling rate is adaptively adjusted according to the relative position of the polygon 20 to the viewpoint; column 6, lines 35-45, column 7, lines 54-56, and column 10, lines 17-32). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel or using less than the super samples for each pixel" and "variable density of samples per pixel, wherein the density varies by region" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

As per claim 33, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which defines the supersampling region; column 7, lines 19-30). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. Cosman teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Cosman, the supersampling rate is adaptively adjusted according to the relative position of the polygon 20 to the viewpoint; column 6, lines 35-45, column 7, lines 54-56, and column 10, lines 17-32). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides an improvement of image's quality through the reduction of aliasing (Cosman, column 3, lines 40-42).

Claims 1-15, and 24-29, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over FORAN et al. (6,072,500) in view of Smyers et al. (6,313,880).

As per claim 1, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which

defines the supersampling region; column 7, lines 19-30); a sample buffer coupled to said graphics processor for storing the plurality of samples (Foran, image processor buffer 52; column 5, lines 41-65); and a sample-to-pixel calculation unit coupled to said sample buffer, wherein said sample-to-pixel calculation unit is configured to select samples from sample buffer and filter said samples to form output pixels, (Foran, image processors 60; column 6, lines 9-32). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. However, Smyers teaches that "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" is well known in the art (Smyers, the image on the screen is a combination of two windows with different sampling rates, which are dependent upon the window's size; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 2 adds into claim 1 "wherein said graphics processor is configured to vary the density of the samples generated within at least a particular one of plurality regions on a basis selected from the group consisting of: a per-scan line basis, a per-group-of-scan-line basis, a per-region basis, a per-pixel basis, and a per-group-of-pixel basis" which

Foran does not explicitly teach. However, Smyers teaches that "wherein said graphics processor is configured to vary the density of the samples generated within at least a particular one of plurality regions on a basis selected from the group consisting of: a per-scan line basis, a per-group-of-scan-line basis, a per-region basis, a per-pixel basis, and a per-group-of-pixel basis" is well known in the art (Smyers, the image on the screen is a combination of two windows with different sampling rates, which are dependent upon the window's size; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 3 adds into claim 1 "wherein said density of samples per pixel for at least one of plurality regions is based one or more of the following: input from an eye-tracking device, input from a head-tracking device, input from a hand-tracking device, input from a mouse, a cursor position, a visible object position, and a main character position" which Foran teaches in column 3, lines 50-54, column 4, lines 11-30 in which the input is from host computer 10 with the polygon information.

Claim 4 adds into claim 1 "said density samples per pixel for at least one of plurality regions is varied according to input from a gaze tracking device" which Foran does not explicitly teach. However, given Foran's graphics processor 10, it would have been obvious to a person of ordinary skill in the art to have the input with varied density from

a gaze tracking device because the accuracy and easy manipulation of the gaze tracking device.

Claim 5 adds into claim 1 "said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities" which Foran does not teach. However, Smyers teaches that "said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities" is well known in the art (Smyers, the density of samples per pixel for the largest window is predetermined; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 6 adds into claim 1 "said density of samples per pixel is substantially continuously variable across one or more frame region boundaries" which Foran does not explicitly teach. However, given Foran's antialiasing technique, it would have been obvious to have the density being substantially continuous because it reduces artifacts by smoothing the appearance of the displayed image.

Claim 7 adds into claim 1 "said sample-to-pixel calculation unit is configured to filter samples to form output pixels on a real time basis" which Foran teaches in column 14, lines 6-26 in which the speed of operation significantly improves.

Claim 8 adds into claim 1 "said sample-to-pixel calculation unit is configured to filter samples to form output pixels on an on-the-fly basis" which Foran teaches in column 13, lines 37-55.

Claim 9 adds into claim 1 "at least a part of each sample is double-buffered in said sample buffer" which Foran does not explicitly. However, given Foran's image buffer for graphics data, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the double-buffer for storing data because it reduces the processing time by allowing simultaneously read and write operations perform on the buffer.

Claim 10 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store information usable to determine sample positions for each sample rendered for a particular pixel position" which Foran does not explicitly teach. However, Smyers teaches that such "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store information usable to determine sample positions for each sample rendered for a particular pixel position" is well known in the art (Smyers, column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density

varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 11 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more sample position schemes, and wherein said graphics processor is configured to read sample positions from said sample position memory" which Foran teaches in column 5, line 66 to column 6, line 32.

Claim 12 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more sample position schemes for one or more sample densities, wherein said graphics processor is configured to read sample positions from said sample position memory according to a selected sample density and a selected sample position scheme" which Foran teaches in column 5, line 66 to column 6, line 32; column 7, lines 31-49.

Claim 13 adds into claim 1 "said graphics processor is configured to store samples in said sample buffer according to bins, wherein each bin has a position, wherein each sample within a bin is assigned an offset relative to said bin positions, and wherein said bin positions correspond to pixel positions on a display device" which Foran does not teach. However, given Foran's image region memories 52, it would have been obvious

to arrange the memory into the sections such as bins or bit map in which the bin's position correspond to the pixel's offset position on display because it increases the memory access time by allowing a group of pixel data to be processed simultaneously.

Claim 14 adds into claim 1 "said bin positions corresponds to pixel positions on a display device" which Foran does not explicitly teach. However, Smyers teaches that such "bin positions corresponds to pixel positions on a display device" is well known in the art (Smyers, column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 15 adds into claim 1 "the specified portion varies by region" which Foran does not teach. However, Smyers teaches that "the specified portion varies by region" is well known in the art (Smyers, the image on the screen is a combination of two windows with different sampling rates, which are dependent upon the window's size; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claims 24-25 claim method based on the system of claims 1-19; therefore, they are rejected under the same reason (see also Foran, column 15, lines 37-42).

Claims 26-28 claim a graphics system based on the graphics system of claims 1-18, therefore, they are rejected under the same reason.

Claim 29 adds into claim 27 "the specified portion for each region is determined by input from a tracking device" which Foran does not teach. However, Smyers teach that a tracking means for tracking the regions is well known in the art (Smyers, column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "the specified portion for each region is determined by input from a tracking device" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Claim 30 is similar to claim 28 but specifies that the samples for supersampling rate is N and the number of samples used for calculating is less than N which Foran does not teach. However, Smyers teaches that "the samples for supersampling rate is N and the number of samples used for calculating is less than N" is well known in the art (Smyers, the image on the screen is a combination of two windows with different sampling rates, which are dependent upon the window's size; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples

per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

As per claim 33, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which defines the supersampling region; column 7, lines 19-30). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. However, Smyers teaches that "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" is well known in the art (Smyers, the image on the screen is a combination of two windows with different sampling rates, which are dependent upon the window's size; column 6, lines 36-55). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides combination of regions with different applications or areas of interest (Smyers, column 3, lines 36-40).

Due to new ground of rejection, this action has been made NON-FINAL.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phu K. Nguyen whose telephone number is (571) 272 7645. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on (571) 272 7664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phu Nguyen

PHU K. NGUYEN
PRIMARY EXAMINER
GROUP 2300

Phu K. Nguyen
April 26, 2007